Shaughnessy No.: 122804

Date Out of EFBWB: JAN 18 1990

TO: Geo. LaRooca/A. Heyward
Product Manager #15
Registration Division (H7505C)

FROM: Paul Mastradone, Ph.D.,Section Chief
Chemistry Review Section #1
Environmental Fate & Ground Water Branch

THRU: Hank Jacoby, Chief
Environmental Fate & Ground Water Branch
Environmental Fate and Effects Division (H7507C)

Attached, please find the EFGWB review of...

Reg./File # : 618-OT

Chemical Name: Avermectin B1a

Type Product : Insecticide/Miticide

Product Name : ZEPHYR 0.15EC

Company Name : MERCK

Purpose : Review adsorption/desorption study (needed to register product on tomatoes).

Date Received: 4/21/89 Action Code: 181

Date Completed: _____ EFGBW#: 90534

Total Reviewing Time (decimal days) : 2.0

Deferrals to: _____ Ecological Effects Branch, EFED

_____ Science Integration & Policy Staff, EFED

_____ Non-Dietary Exposure Branch, HED

_____ Dietary Exposure Branch, HED

_____ Toxicology Branch, HED

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1.0 CHEMICAL:

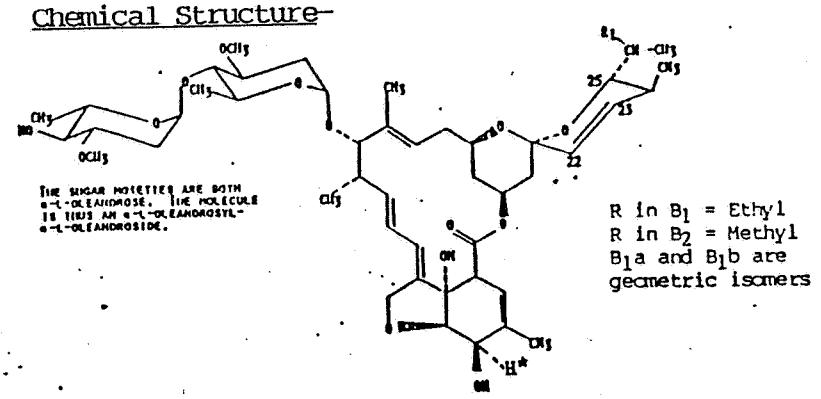
Common Name- Abamectin

Chemical Name- Avermectin

Trade Name- ZEPHYR 0.15 EC

Chemical Structure-

Chemical Structure-



The acive ingredient is composed of not less than 80% avermectin B_1a and not more than 20% avermectin B_1b.

2.0 TEST MATERIAL: Levels of avermectin B1a ranging from 0.0056 to 2.17 ug/g were tested.

3.0 STUDY/ACTION TYPE: The registrant is requesting the review of an adsorption/desorption study, as part of the data requirements to register Zephyr 0.15 EC on tomatoes.

4.0 STUDY IDENTIFICATION:

Gruber, V.E. and P.G. Wislocki. 1988. Sorption/Desorption of Avermectin B1a with clay, silt, and sand soils. Merck Sharp & Dohme Research Labs, Three Bridges, NJ. MRID # 40856301

5.0 REVIEWED BY:

Herbert L. Manning, Ph.D.
Microbiologist, EFGWB/EFED

Signature: Herbert L. Manning
Date: JAN 18 1990

6.0 APPROVED BY:

Paul J. Mastradone, Ph.D.
Chief, Section 1, EFGWB/EFED

Signature: Paul J. Mastradone
Date: JAN 18 1990

7.0 CONCLUSION:

7.1 The EFGWB concludes that the study is acceptable and fully satisfies the Leaching- Adsorption/Desorption data requirement. An aged leaching study was previously accepted 3/28/84.

7.2 The data indicate that avermectin B1a binds strongly to the clay loam and silt loam test soils (Kads of 134 and 30.9, respectively); however, it is less tightly bound to the sand soil (Kads of 9.7). Freundlich constants for desorption (Kdes) were similar to those for adsorption (Kads) (Table 6).

8.0 RECOMMDNDATION-

Inform the registrant that the data requirement for Leaching-Adsorption/Desorption has been fully satisfied (an aged leaching study was accepted 3/28/84).

9.0 BACKGROUND:

A. Introduction- A previous review (3/28/84) indicated the immobility of avermectin during a soil TLC study. Soil column tests in the same review detected radioactivity (<8%, mainly polar products) in the leachates of the 4 columns in both aged and unaged residues. A field dissipation study on grass did not show leaching down to 25 inches (review of 9/5/85).

B. Directions for Use- See review of 3/6/89.

10.0 DISCUSSION OF INDIVIDUAL STUDY:

See attached DER (DATA EVALUATION RECORD).

11.0 COMPLETION OF ONE-LINER:

The one-liner in our file has been updated as per this review.

12.0 CBI APPENDIX: There is no CBI in this review.

DATA EVALUATION RECORD

STUDY IDENTIFICATION:

Gruber, V.E. and P.G. Wislocki. 1968. Sorption/Desorption of Avermectin B1a with Clay, Silt, and Sand Soils. Merck Sharp & Dohme Research Labs, Three Bridges, NJ. MRID #40856301.

REVIEWED BY:

Herbert L. Manning, Ph.D. Signature: Herbert L. Manning
Microbiologist, EFGWB/EFED Date:

APPROVED BY:

Paul J. Mastradone, Ph.D. Signature:
Chief, Section 1, EFGWB/EFED Date:

TYPE OF STUDY: LEACHING- ADSORPTION/DESORPTION

CONCLUSIONS:

1. The study is acceptable and fulfills the data requirement for Leaching-Adsorption/Desorption. An aged leaching study was previously accepted 3/28/84.

2. Avermectin B1a was shown to bind strongly to the test soils clay loam and silt loam (Kds of 134 and 30.9, respectively); it is less tightly bound in the sand soil (Kads of 9.7). The Freundlich constants for adsorption (Kads) were similar to those for desorption (Kdes) (Table 6).

MATERIALS AND METHODS:

Radiolabeled avermectin B1a (tritium-labeled at 5-H, 96% purity) at levels of 0.0056, 0.0292, 0.233, and 2.17 ppm were used to treat clay loam (Houston, TX), sand (Lakeland, FL), and silt loam (Three Bridges, NJ) soils. See Table 1 for soil characteristics. These same soils were used in the previously reviewed soil thin-layer chromotagraphy (TLC) and soil columns studies (3/28/84). Duplicate 2 g samples of each soil in 50 ml roundbottom, centrifuge tubes were mixed with 10 ml of 0.01 $CaSO_4$ solution and then treated with 20 ul of a stock solution to give the final concentrations of avermectin shown above. The samples were capped and shaken by hand before being placed on a Burrell wrist action shaker (room

temperature) for 16 hours to equilibrate. The samples were then centrifuged for 5-10 min at about 2000 rpm. Triplicate one ml aliquots of the supernatant were analyzed by LSC (Liquid Scintillation Counting); additional analysis was by HPLC (High Performance Liquid Chromatography).

In testing for desorption, fresh 0.01 M $CaSO_4$ (equal in volume to that removed) was added to the sample, equilibrated for 16 hours on the wrist action shaker, centrifuged, and the supernatant analyzed for radioactivity. The bound avermectin was removed from the soil by the addition of methanol, with subsequent shaking (16 hours), centrifugation, and LSC and HPLC analyses.

REPORTED RESULTS:

Tables 2 and 6 summarize the data. The study findings were as follows:

1. The average recovery of radioactivity was 102%, with a range of 89.6 to 111%.

2. The recovery data (above) indicates that the desorption of bound avermectin from soil using methanol was fairly complete.

3. A preliminary experiment determined that the equilibrium of avermectin B1a with the clay soil was complete at 6 hours.

4. Kd values were 134 for clay loam, 9.7 for sand, and 30.9 for silt loam when the avermectin concentration was 2.17 ppm (Table 6).

5. The adsorption of avermectin to clay loam soil was not concentration dependent, whereas for the sand and silt loam soils adsorption was concentration dependent.

6. Table 6 shows the similarity of the Kads to the Kdes.

DISCUSSION:

1. The study is acceptable and fully satisfies the data requirement for Leaching-Adsorption/Desorption.

2. The data indicate that avermectin B1a binds strongly to clay loam (Kd= 134) and silt loam (Kd= 30.9) soils. In the sand soil, it was less strongly bound (Kads 9.7).

3. This data (showing lack of mobility) agrees with TLC data (review of 3/28/84, EAB #4170) that places avermectin in the immobile class (Class I, Helling and Turner classification). It also agrees with a field dissipation on grass (9/5/85, EAB #5445-6) that did not show leaching down to 25 inches.

4. While this adsorption/desorption study was conducted using radio labeling (tritium) only in one atom of the molecule, the reverse phase-HPLC radioactivity profiles of the final methanol extract of the 3 soils (2.17 ppm level) indicated that avermectin was stable during the adsorption/desorption procedures (purity

of avermectin in stock solution D was 96%; purities of avermectin in the 3 soils after adsorption/desorption was 96 +/-2%).

EFGWB review dated 1/8/90 (100-895 & 100-898)

Page _____ is not included in this copy.

Pages 7 through 12 are not included in this copy.

The material not included contains the following type of information:

_____ Identity of product inert ingredients.

_____ Identity of product impurities.

_____ Description of the product manufacturing process.

_____ Description of quality control procedures.

_____ Identity of the source of product ingredients.

_____ Sales or other commercial/financial information.

_____ A draft product label.

_____ The product confidential statement of formula.

_____ Information about a pending registration action.

✓ FIFRA registration data.

_____ The document is a duplicate of page(s) _____.

_____ The document is not responsive to the request.

The information not included is generally considered confidential by product registrants. If you have any questions, please contact the individual who prepared the response to your request.
